



United States
Environmental Protection
Agency

Region 5
77 West Jackson Boulevard
Chicago, IL 60604

Office of Research and Development

ENVIRONMENTAL RESEARCH SEMINAR

*Bringing EPA STAR (Science to Achieve Results)
Research to State, Federal and Tribal Environmental Programs in Region 5*

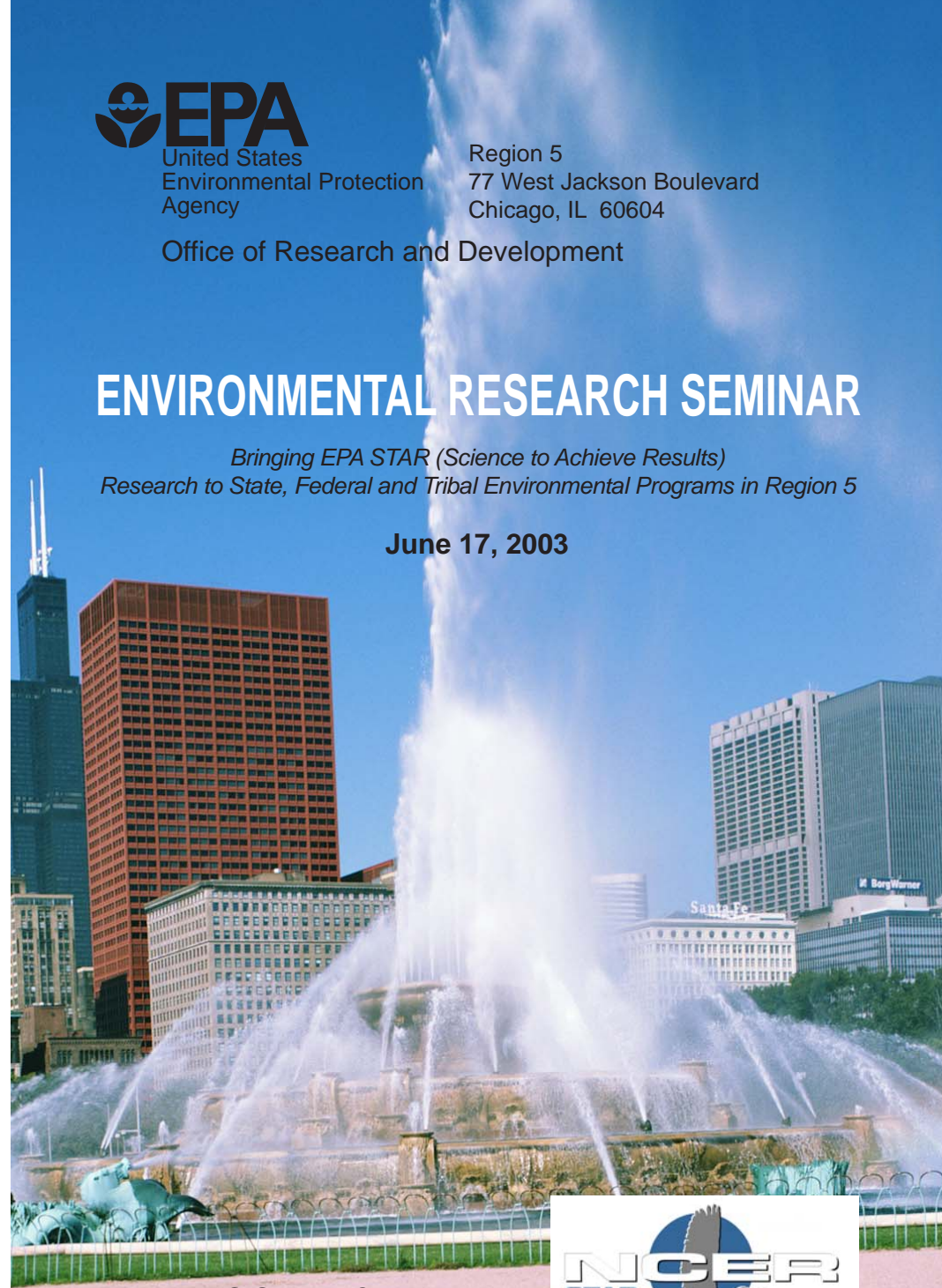
June 17, 2003



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77 West Jackson Blvd.
Chicago, IL 60604

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Information Inside



Seminar Overview

EPA's National Center for Environmental Research funds hundreds of environmental research projects nationwide every year. During the past 5 years, grant recipients focusing on Region 5-based research have successfully competed and been awarded over \$44 million dollars. EPA Region 5 has asked a select number of these grant recipients to present their research and findings at a one-day seminar to an invited audience at EPA's Region 5 office in downtown Chicago.

This is a rare and unique opportunity for federal, state, and tribal scientists and engineers to learn about a variety of science projects ranging from, but not limited to, environmental monitoring, innovative technologies for site remediation, water-borne diseases, and studies on human health effects from exposures to contaminants.

Attendees will have two speaker sessions to choose from each hour.

Don't miss this unique opportunity to hear from these twelve respected researchers and experts and learn about how their discoveries might have an impact on environmental science and policy making, your environmental program, your project, your state and your community.

Who Should Attend

Speakers and research projects were specifically selected to address the needs and interests of federal, state, and tribal environmental employees. The purpose of this seminar is to educate and engage discussion between researchers and scientists from federal, state and tribal environmental programs on the latest state of the art in environmental research. The seminar also will give researchers in Region 5 the opportunity to discuss their research in the context of EPA environmental science needs and priorities.

Teleconferencing/Webcast

We are planning to webcast sessions from our Region 5 STAR conference. If you cannot join us in Chicago, you may participate remotely via the CLU-IN web site. The slide presentations are mounted there and a limited number of phone lines are available to listen. You must register online in advance to participate in the conference webcast. For more information and to register for the webcast session, see <http://clu-in.org/region5star/register> . Upon completing the registration, you will be given all the access information necessary to join us.

Seminar Information

For more information on this seminar contact
Gilberto Alvarez at 312 886-6143
alvarez.gilberto@epa.com or
Estella Waldman at 202 564-6836

Date: Tuesday, June 17, 2003

Time: 8:10 a.m. — 4:30 p.m.

Location: EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604
Lake Michigan Room
and
Lake Huron Room
12th Floor

Welcome!

From Conference Cosponsors and Guest Speakers

Region 5 is proud to be home to many nationally recognized institutions and individuals who are on the forefront of environmental science and research. We are equally proud to cosponsor this important seminar, which will allow government policy makers, scientists, and program managers to learn from the region's premier environmental researchers in fields as varied as Region 5's landscape. I hope you will join us.

Bharata Mathur

Deputy Regional Administrator EPA Region 5



This workshop gives you the opportunity to interact with some of the area's leading scientists conducting research on issues of critical importance to your region. The STAR grantees are an important part of EPA's research program and provide us with the nation's best scientists and engineers from both academic and nonprofit research centers. Please join us at this special event.

Dr. Paul Gilman

EPA Science Advisor and Assistant Administrator,
Office of Research and Development

EPA Regional & EPA/ORD Collaboration Pilot Sponsored by the EPA
Region 5 Regional Science Council and EPA/ORD/NCER



3:30 - 4:20

Sessions 11 & 12

Schwab or Stein



Paul Schwab, Ph.D.

Department of Agronomy, Purdue University

**THE EFFECT OF HIGHER PLANTS ON THE
BIOAVAILABILITY AND TOXICITY OF PETROLEUM
CONTAMINANTS IN SOIL**

Toxicity to plants is often used to assess environmental contamination. In addition, phytoremediation is showing great promise as a clean-up technology. However, the effects of plants on microbial degradation have not been identified. The plants in this field trial were not affected by the soil contaminants after nine months of aging. Root development was extensive in the second year of the project. Bacterial numbers, petroleum degraders, and plant biomass increased with time, and a strong relationship existed between the presence of plants and the degradation of total petroleum hydrocarbons in our plots. Plant roots enhanced petroleum degradation by exploring the soil and stimulating microbial activity. Initial toxicity was observed for all tests, but by the end of the test period, no differences in toxicity existed among the vegetation treatments.



Michael Stein, Ph.D., Professor of Statistics &
Director of CISES, University of Chicago

**AN OVERVIEW OF THE CENTER FOR INTEGRATING
STATISTICAL AND ENVIRONMENTAL SCIENCE**

The Center for Integrating Statistical and Environmental Science (CISES) was funded in 2002 to support research to develop new statistical methods for addressing environmental problems and integrate the use of statistics throughout the process of risk assessment. CISES presently supports interdisciplinary teams of researchers working on five projects: investigating the relationship between air pollution and respiratory illnesses in an urban setting, statistical design and analysis for estimating trends in environmental indicators, approaches for combining numerical models and statistical methods, quasi-experimentation to assess the relationship between infant mortality and particulate air pollution, and developing stochastic models and model selection procedures for complex ecological systems.

2:30 - 3:20

Sessions 9 & 10

Khanna or Adgate



Madhu Khanna, Ph.D., Associate Professor
Dept. of Agricultural and Consumer Economics
University of Illinois, Urbana-Champaign

**CORPORATE ENVIRONMENTAL MANAGEMENT:
ECONOMIC INCENTIVES AND IMPLICATIONS FOR
TOXIC RELEASES**

This research examines the motivations for a sample of S&P 500 firms to adopt an environmental management system (EMS) and its implications for their toxic release intensity and financial performance. We find that potential liability threats and pressures from consumers, investors and the public are motivating EMS adoption and that consumer pressures are particularly effective in raising the quality of EMS for firms that would otherwise be low adopters. A more comprehensive EMS is found to lead to lower toxic emissions per unit output for firms, particularly for those with higher pollution intensity in the past. Environmental Management Systems result in reductions in both offsite transfers and onsite releases per unit output. We also find that more comprehensive EMSs raise a firm's environmental efficiency, indicating the potential costs of pollution reduction in terms of foregone output. Additionally, EMS adoption has a direct effect on profitability and an indirect effect that raises environmental efficiency, except in industries that are either very small or very large polluters.



John L. Adgate, Ph.D.
University of Minnesota, School of Public Health,
Division of Environmental and Occupational Health

**PRIMARY PATHWAYS OF ORGANOPHOSPHATE EXPO-
SURE: RESULTS FROM THE MINNESOTA CHILDREN'S
PESTICIDE EXPOSURE STUDY (MNCPEs)**

Pesticides are ubiquitous in our society and long-standing concerns exist about the potential health effects associated with their use. Organophosphate pesticides (OPs) are widely used in agriculture and around the home because they are relatively inexpensive, less prone to pest resistance, and break down relatively quickly in the environment.

Recently there has been increasing concern about the potential effects of pesticides on children's health. Among the reasons children may be at potentially greater risk are their lower body weights, developing organs, higher metabolic rates, and unique behavior patterns. Relatively little data exist on actual exposures in children, particularly at the upper end of the exposure distribution. The Minnesota Children's Pesticide Exposure Study was a NHEXAS (National Human Exposure Assessment Survey) special study designed to obtain multi-media exposure estimates for several pesticides and other compounds. This presentation summarizes important aspects of the multi-stage study design and data collection, reviews results of biomonitoring and pathway analyses, and discusses the implications of these results for future studies in children.

Agenda at a Glance

R5 STAR Science Seminar Agenda

June 17, 2003

Lake Michigan Room (LMR) & Lake Huron Room (LHR)

8:10-8:30	Check-in
8:30-8:45	Seminar Introductions and Overview (Lake Michigan Room) Gilberto Alvarez, <i>Regional Scientist, EPA Region 5</i> David Macarus, <i>Regional Science Liaison, EPA Region 5</i> Jerri Anne-Garl, <i>Director, Office of Strategic Environmental Analysis, EPA Region 5</i>
8:45-8:55	Welcoming Remarks Bharat Mathur, <i>Deputy Regional Administrator EPA Region 5</i>
8:55-9:20	Remarks J. Paul Gilman, <i>EPA Science Advisor and Assistant Administrator, Office of Research and Development</i>

NOTE: There is a 10-minute break between each session

9:20-09:30	Morning Break	LMR or LHR
09:30-10:20	Sessions 1 & 2	Niemi or Chuang
10:30-11:20	Sessions 3 & 4	Warshawsky or Hurley
11:30-12:20	Sessions 5 & 6	Rugh or Lodge
12:20-1:30	LUNCH (on your own)	
1:30-2:20	Sessions 7 & 8	Banks or Robins
2:30-3:20	Sessions 9 & 10	Khanna or Adgate
3:30-4:20	Sessions 11 & 12	Schwab or Stein
4:20-4:30	Wrap Up and Adjourn	

9:30 - 10:20

Sessions 1 & 2

Niemi or Chuang



Gerald Niemi, Ph.D.

Natural Resources Research Institute
University of Minnesota

**DEVELOPING ENVIRONMENTAL INDICATORS FOR THE
COASTAL REGION OF THE U.S. GREAT LAKES**

In January 2001, researchers initiated a four-year project to identify, evaluate, and recommend a portfolio of multi-scaled environmental indicators that could be applied to the entire coastal region of the U.S. Great Lakes. The major question was "what environmental indicators can be developed to efficiently, economically, and effectively measure and monitor the condition and integrity of the coastal region?" Researchers identified a suite of environmental (state) indicators that represent individual, population, community, and landscape-level endpoints, thereby describing the range necessary to cover the immense area of the Great Lakes coastal region. The indicators include land use and landscape characteristics as well as amphibian, bird, diatom, fish, macroinvertebrate, and plant communities. Over 200 GIS data layers of potential stress to the coastal region were used in the random stratified sampling design. More information on the project can be found at: <http://glei.nrri.umn.edu>.



Jane C. Chuang

Senior Research Scientist
Battelle Memorial Institute, Columbus, Ohio

**PESTICIDE EXPOSURES OF PRESCHOOL CHILDREN
OVER TIME (PEPCOT)**

Young children are likely to be more susceptible than adults to the effects of pollutants in their everyday environments because of their immaturity, rapid development, and behaviors. Concern for children's exposures led EPA to ban the use of several pesticides in homes and schools. In this study, children's exposures to the banned organophosphate pesticides, chlorpyrifos and diazinon, and to several alternative pesticides are being measured in the air, dust, soil, surface residues, food, and beverages that they contact in and around their homes. Participants include about 100 children in 50 households, ranging in age from newborn to three years old. Their exposures are measured once each year for three years. The results will improve the scientific basis for estimating the risks to young children of pesticide exposure in their everyday environments.

1:30 - 2:20

Sessions 7 & 8

Banks or Robins



Kathy Banks, Ph.D.

Professor of Soil Physical Chemistry
School of Civil Engineering, Purdue University

**DEWATERING, REMEDIATION, AND EVALUATION OF
DREDGED SEDIMENTS USING HIGHER PLANTS**

Dredging operations remove large quantities of sediments from rivers and lakes in the United States to keep the waters navigable. Some of the sediments are placed on land because the concentrations of regulated contaminants exceed the allowable levels for unrestricted, open-water placement. A need exists to remediate these sediments to make them suitable for beneficial uses such as industrial fill, construction materials or manufactured soil. Using a greenhouse experiment, we are screening the suitability of candidate plants for their ability to remove water from sediments and remediate contaminants. The plant-based technology also is being tested in the field on dredged material currently stored near Milwaukee, Wisconsin. In the dewatering phase of the project, small trees and other plants have been densely planted in the confined placement facility and allowed to grow for at least one year. The plantings will be used to compare the effects of species and management practices. At the end of the growth period, we will recommend specific plant species for dewatering and remediating sediments.



Thomas G. Robins, MD, MPH

Professor of Occupational Medicine
School of Public Health, University of Michigan

**COMMUNITY ACTION AGAINST ASTHMA:
USING A COMMUNITY-BASED RESEARCH APPROACH
TO REDUCE ENVIRONMENTAL TRIGGERS TO
CHILDHOOD ASTHMA IN DETROIT, MICHIGAN.**

Community Action Against Asthma (CAAA) is an interdisciplinary, community-based participatory research project of the Michigan Center for the Environment and Children's Health (MCECH), created and implemented by a partnership of community-based organizations, health agencies, and universities. CAAA conducted an epidemiologic investigation in Detroit of environmental risk factors for asthma exacerbation, integrated with household intervention, among 302 asthmatic children and their families. Important findings include that outdoor exposure to fine particulate matter is above the newer standards; smoking inside homes substantially increased indoor particulate matter exposure; many children are both allergic and exposed to high levels of cockroach allergens in household dust; outdoor exposure to both ozone and particulate matter leads to decreased lung function among children allergic to cockroach allergens; a household intervention conducted by community health workers decreased allergen levels in household dust, improved children's asthma symptoms and lung function, and reduced health care utilization.

11:30 - 12:20

Sessions 5 & 6

Rugh or Lodge



Clayton L. Rugh, Ph.D.

Assistant Professor of Phytoremediation
Department of Crop and Soil Sciences,
Michigan State University

**PLANT-ASSISTED MICROBIAL DEGRADATION OF
PCBS IN SOIL**

The Michigan State University Phytoremediation Research Program uses a multidisciplinary strategy of vegetated systems for environmental rehabilitation. Some of our projects take an intensive biotechnological approach to genetically engineer plants with enhanced or new capabilities for contaminant degradation and/or extraction. Several other projects investigate the abilities of regional, native plants to achieve "natural" soil remediation with concurrent habitat reconstruction. These efforts are focused on detoxifying soils and sediments contaminated by a wide range of organic pollutants, including polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and nitroaromatic compounds (NACs). We are currently collaborating with Dr. S.K. Dutta's lab at Howard University to identify plant species that can support enhanced PCB metabolism. We are using molecular genetic approaches to characterize soil microbial community structure in the root zone of planted soils contaminated with PCBs. These methods will allow us to identify the most effective phytoremediation treatments for enhanced PCB degradation in the rhizosphere.



David Lodge, Ph.D.

Professor of Biological Sciences
University of Notre Dame

**PREDICTING THE IDENTITY, SPREAD, AND
IMPACT OF FUTURE NONINDIGENOUS SPECIES
IN THE GREAT LAKES**

The overall objective of this research is to develop techniques to predict future invasions of nonindigenous species. Our model system uses aquatic organisms introduced to the Great Lakes in ship ballast water. We are sampling ballast tanks to measure the numbers of organisms introduced by ballast water. Mathematical modeling of representative species using population viability analysis is being used to identify how the risk of species establishment changes with the number of organisms introduced. Also multivariate statistical techniques are being used to relate different stages of the invasion process to characteristics of different aquatic species and screen species from different global regions that are likely to be introduced to the Great Lakes. The results and models will be applied to identify species that pose the greatest risk to the Great Lakes so that more effective management can prevent invasions by those species.

10:30 - 11:20

Sessions 3 & 4

Warshawsky or Hurley



David Warshawsky, Ph.D.

Department of Environmental Health
University of Cincinnati Medical Center

**EVALUATING THE CARCINOGENIC POTENCY OF
COMPLEX MIXTURES**

Complex mixtures of combustion and related products contain many carcinogens and anti-carcinogens of varying potency that interact in theoretically unpredictable ways. The conventional mouse-skin tumor carcinogenesis assay is too time consuming and expensive to be of more than limited use. When based on tumor initiation alone, skin tumor assays are too slow and not very accurate in predicting cancer outcomes. This research evaluated a new and more rapid approach for assessing carcinogenic potency using cancer induction as the endpoint. Coke-oven tar was used as the tumor initiator and progressor with benzo[a]pyrene as the positive control. Tumors start appearing at 7 weeks after the start of exposure using an initiation- progression protocol with 32 µg and 64 µg of benzo[a]pyrene. However, using a complete carcinogenesis protocol and 64 µg of benzo[a]pyrene, tumors start appearing at 15 weeks. Also, no tumors appear following 22 weeks of exposure using the carcinogenesis protocol with 32 µg of benzo[a]pyrene.



James P. Hurley, PhD

Assistant Director for Research and Outreach,
University of Wisconsin Aquatic Sciences Center

**WATERSHED INFLUENCES ON TRANSPORT, FATE, AND
BIOAVAILABILITY OF MERCURY IN LAKE SUPERIOR**

Our research group is completing a study of mercury in the Lake Superior Basin designed to: 1) determine the forms and bioavailability of mercury transported by tributaries and watersheds; 2) determine the importance of watershed-specific characteristics (soil type, land use, surficial deposits) in controlling the physical/chemical forms of mercury; 3) identify key mechanisms controlling mercury bioavailability and its forms in nearshore zones relative to open lake regions; and 4) provide data for model development. We have assembled a preliminary mass balance for Lake Superior and determined that atmospheric deposition dominated the supply of total mercury and methylmercury. However, methylmercury seems to concentrate in nearshore zones where biotic uptake is enhanced. We have also shown that the mixing zones for ground and surface water can be important sites of methylmercury formation in both forests or wetlands.

FREE! Attendee Registration For EPA's Environmental Research Seminar

All information must be filled out completely. One name per form. Please make additional copies as needed. Registration is necessary as seating is limited. Do not duplicate this form by mail if you have already registered by fax or on line.

For more information on this seminar contact Gilberto Alvarez at 312 886-6143 or Estella Waldman at 202 564-6836.

*Please register no later than **June 10, 2003***

FAX

1 312 353-5374

MAIL

Frances Dean
EPA R5
77 W. Jackson Blvd.
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extra forms
from our web site
www.epa.gov/region5/

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Organization _____
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Please check the boxes for the Sessions you wish to attend:

- ☐ Session 1 Developing Environmental Indicators for the Coastal Region of the U.S. Great Lakes
or
☐ Session 2 Pesticide Exposures of Preschool Children Over Time (PEPCOT)
- ☐ Session 3 Evaluating the Carcinogenic Potency of Complex Mixtures
or
☐ Session 4 Watershed Influences on Transport, Fate, and Bioavailability of Mercury in Lake Superior
- ☐ Session 5 Plant-Assisted Microbial Degradation of PCBs in Soil
or
☐ Session 6 Predicting the Identity, Spread, and Impact of Future Nonindigenous Species in the Great Lakes
- ☐ Session 7 Dewatering, Remediation, and Evaluation of Dredged Sediments Using Higher Plants
or
☐ Session 8 Community Action Against Asthma: Using a Community-Based Research Approach to Reduce Environmental Triggers to Childhood Asthma in Detroit, Michigan
- ☐ Session 9 Corporate Environmental Management: Economic Incentives and Implications for Toxic Releases
or
☐ Session 10 Primary Pathways of Organophosphate Exposure: Results From the Minnesota Children's Pesticide Exposure Study (MNCPES)
- ☐ Session 11 The Effect of Higher Plants on the Bioavailability and Toxicity of Petroleum Contaminants in Soil
or
☐ Session 12 An Overview of the Center for Integrating Statistical and Environmental Science